CERTIFICATION

I, Yukie KOJO, of 1-2-16 Tennou, Ichinomiya-shi, Aichi-ken, 491-0046, Japan, accompanying certified copy of the documents in respect of an application for a patent filed in Japan on the 29 day of January, 1998 and of the official certificate attached thereto, and certify that the following is a true and correct translation to the best of my knowledge and belief.

Yukie Kojo

Dated this 2 day of May, 2003

PCT/JP98/03222

日本国特許庁
PATENT OFFICE
JAPANESE GOVERNMENT

16.07.98

別紙添付の書類に記載されている事項は下記の出願書類に記載されてる事項と同一であることを証明する。
This is to certify that the annexed is a true copy of the following application as filed with this Office.

出願年月日
Date of Application: １９９８年　１月２９日

出願番号
Application Number: 平成１０年特許願第０３３９４２号

出願人
Applicant (s): トヨタ車体株式会社

１９９８年　８月２１日

特許庁長官
Commissioner,
Patent Office 伊佐山建志

出証番号　出証特平１０－３０６５９６９

PATENT OFFICE

JAPANESE GOVERNMENT

This is to certify that the annexed is a true copy of the following application as filed with this office.

Date of Application : January 29, 1998

Application Number : JP 10-033942 (1998-033942)

Applicant(s) : TOYOTA SHATAI KABUSHIKI KAISHA

August 21, 1998

Commissioner, Kenji ISAYAMA
Patent Office

Certification Issuance
No. 1998 - 3065969

[Name of Document] Patent Application

[Reference Number] B-60960

[Date of Submission] January 29, 1998

[Addressee] Commissioner of the Patent Office

[International Patent Classification] B60R 21/20

[Title of the Invention] Panel For Air Bag

[Number of claims] 11

[Inventor]

[Address] c/o TOYOTA SHATAI KABUSHIKI KAISHA, 100, Kanayama, Ichiriyama-cho, Kariya-shi, Aichi-ken, Japan

[Name] Yasuo KONDO

[Inventor]

[Address] c/o TOYOTA SHATAI KABUSHIKI KAISHA, 100, Kanayama, Ichiriyama-cho, Kariya-shi, Aichi-ken, Japan

[Name] Nobuo INOMATA

[Inventor]

[Address] c/o TOYOTA SHATAI KABUSHIKI KAISHA, 100, Kanayama, Ichiriyama-cho, Kariya-shi, Aichi-ken, Japan

[Name] Takashi UEDA

[Inventor]

[Address] c/o TOYOTA SHATAI KABUSHIKI KAISHA, 100, Kanayama, Ichiriyama-cho, Kariya-shi, Aichi-ken, Japan

[Name] Isao HATASHI

Certification Issuance

No. 1998 - 3065969

[Inventor]

[Address] c/o TOYOTA SHATAI KABUSHIKI KAISHA, 100, Kanayama, Ichiriyama-cho, Kariya-shi, Aichi-ken, Japan

[Name] Tsutomu OKANO

[Applicant]

[ID Number] 000110321

[Name] TOYOTA SHATAI KABUSHIKI KAISHA

[Claim of Priority Based on Prior Application]

[Application] 1997-214138

[Date of Submission] July 23, 1997

[Attorney]

[ID number] 100079142

[Patent Attorney]

[Name] Yoshiyasu TAKAHASHI

[Fee]

[Account Number] 009276

[Amount of payment] 21,000 yen

[List of Appended Documents]

[Document] Description 1

[Document] Abstract 1

[ID Number of General Power of Attorney] 9006084

Certification Issuance

No. 1998 - 3065969

[JP 10-33942]

AIR BAG PANEL

[Scope of Claims for a Patent]

[Claim 1]

A panel for an air bag of a vehicle in which an air bag cover made of a soft synthetic resin is integrally molded in an instrument penal main body made of a hard synthetic resin, comprising:

a joint portion joined with said airbag cover provided around an opening portion formed in said instrument panel main body,

characterized in that said joint portion constitutes an overlapping portion in which said airbag cover is overlapped as being arranged on an inner side.

[Claim 2]

A panel for an air bag as claimed in claim 1, characterized in that a concavo-convex portion having a serrate shape or a downward convex shape is provided on a lower face of the instrument panel main body in said overlapping portion.

[Claim 3]

A panel for an air bag as claimed in claim 1, characterized in that the instrument panel main body and the airbag cover are joined in the overlapping portion by high frequency induction heating or vibration melt-bonding.

[Claim 4]

A panel for an air bag as claimed in claim 1, characterized in that a groove portion having a closed curve shape is formed in a boundary portion

of an end portion of the opening portion of the instrument panel main body in the airbag cover, and a thin wall portion which is ruptured and a non-thin wall portion which is not ruptured at operating time of the air bag are formed along said groove portion in said airbag cover in a single line shape or a shape of plural continuous lines.

[Claim 5]

A panel for an air bag as claimed in claim 4, characterized in that said non-thin wall portion is formed in a shape of one transversal line on an upper or lower side of the air bag cover, and said thin wall portion is formed in a U-shape along a groove portion in three directions except for the line forming said non-thin wall portion.

[Claim 6]

A panel for an air bag as claimed in claim 4, characterized in that said non-thin wall portion is formed in a shape of one transversal line on an upper or lower side of the air bag cover, and said thin wall portion is formed along an entire periphery of said groove portion such that a line forming said non-thin wall portion is included in an inner side.

[Claim 7]

A panel for an air bag as claimed in claim 4, characterized in that said non-thin wall portion is formed in a shape of one transversal line on upper and lower sides of the air bag cover, respectively, said thin wall portion is formed a shape of one longitudinal line on right and left sides of the air bag cover, respectively, and a second thin wall portion which is not formed along the groove portion is formed in a shape of one transversal line on a central portion of the air bag cover, whereby the first and second thin wall portions are entirely formed in an H-shape.

[Claim 8]

A panel for an air bag as claimed in claim 4, characterized in that said non-thin wall portion is formed in a shape of one transversal line on upper and lower sides of the air bag cover, respectively, said thin wall portion is formed along an entire periphery of the groove portion such that a line forming said non-thin wall portion is included in an inner side, and a second groove portion which is not formed along the groove portion is formed in a shape of one transversal line on a central portion of the air bag cover, whereby the first and second thin wall portions are entirely formed in a shape in which two quadrilaterals are lined up. [Claim 9]

A panel for an air bag as claimed in claim 4, characterized in that said non-thin wall portion is formed in a shape of one longitudinal line on right and left sides of the air bag cover, respectively, said thin wall portion is formed in a shape of one transversal line on upper and lower sides of the air bag cover, respectively, and a second thin wall portion which is not formed along the groove portion is formed in a shape of one transversal line on a central portion of the air bag cover, whereby the first and second thin wall portions are entirely formed in an H-shape. [Claim 10]

A panel for an air bag as claimed in claim 4, characterized in that said non-thin wall portion is formed in a shape of one longitudinal line on right and left sides of the air bag cover, respectively, said thin wall portion is formed along an entire periphery of the groove portion such that a line forming said non-thin wall portion is included in an inner side, and a second thin wall portion which is not formed along the groove portion is formed in a shape of one longitudinal line on a central portion of the air bag cover, whereby the first and second thin wall portions are

entirely formed in a shape in which two quadrilaterals are lined up.

[Claim 11]

A panel for an air bag as claimed in claim 4, characterized in that a rib is provided in said non-thin wall portion in a protruding manner, and said rib is connected to the air bag case via a connection member.

[Detailed Description of the Invention]

[0001]

[Technical Field]

The present invention relates to a panel for an airbag of a vehicle in which an airbag cover made of a soft synthetic resin is formed in an instrument panel main body.

[0002]

[Prior Art]

An air bag provided in a front passenger seat side of a vehicle is housed in a rear side of an instrument panel, and when the airbag is operated, the airbag cover mounted on the instrument panel is opened and the airbag is swollen out toward a front side of the instrument panel.

Then, as shown in Fig. 21, an airbag cover 92 and an instrument panel main body 91 are formed as separate members and the airbag cover 92 is fixed to the instrument panel main body 91 by a fixing device (not shown). Further, the airbag main body is swollen out toward a front side of the instrument panel by rupturing a weak portion such as a thin wall portion formed in advance in the airbag cover 92.

[0003]

[Problem to be Solved by the Invention]

However, in the panel for the airbag having the structure mentioned

above, since the instrument panel main body 91 and the airbag cover 92 are made individually in separate processes, a certain number of producing works are required with respect to each of the members, and it is necessary to perform an assembly work for integrally assembling both the members 91 and 92 and to arrange a fixing device. Accordingly, there exists a problem that an entire manufacturing cost is increased.

[0004]

The present invention is made by taking the conventional problems into consideration, and the present invention provides a panel for an airbag for a vehicle which is easily manufactured at a low cost.

[0005]

[Means for Solving Problems]

The invention described in claim 1 is a panel for an air bag of a vehicle in which an air bag cover made of a soft synthetic resin is integrally molded in an instrument penal main body made of a hard synthetic resin, comprising:

a joint portion joined with the airbag cover provided around an opening portion formed in the instrument panel main body,

characterized in that the joint portion constitutes an overlapping portion in which the airbag cover is overlapped as being arranged on an inner side.

[0006]

In this invention, the overlapping portion is arranged around the opening portion of the instrument panel main body, in which the airbag cover is overlapped as being arranged on the inner side. Therefore, neither fixing device for connecting both members nor connecting work is required. Thus, in accordance with the present invention, the number of producing

works and cost can be greatly reduced in comparison with a conventional product in which the instrument panel main body and the airbag cover are separately formed.

[0007]

As a particular means for improving a joining strength of both the members in the overlapping portion mentioned above, for example, it is preferable that a concavo-convex portion having a serrate shape or a downward convex shape is provided on a lower face of the instrument panel main body in the overlapping portion, as described in claim 2. This structure utilizes a so-called anchor effect yielded from biting a part of the airbag cover into a concave portion of the concavo-convex portion. The joining strength of both members is improved by this anchor effect.

[0008]

Further, it is possible to prevent distortion at a molding time of a peripheral edge of the opening portion of the instrument panel main body. That is, when the airbag cover is molded after molding the instrument panel main body, the concavo-convex portion of the overlapping portion becomes resistance against injection force of a material for molding the airbag cover. Therefore, no peripheral edge of the opening portion of the instrument panel main body is distorted due to the injection force of the material which pushes the overlapping portion of the instrument panel main body.

[0009]

Further, as other particular means, for example, as described in claim 3, it is preferable that the instrument panel main body and the airbag cover are joined in the overlapping portion by high frequency induction heating or vibration melt-bonding. This structure improves the joining

strength of the airbag cover to a joint portion of the instrument panel main body by applying high frequency induction heating or vibration at a time of molding the airbag cover.

In each of the above two means, it is possible to improve the joining strength of the instrument panel main body and the airbag cover by an easy method and a simple structure.

[0010]

Further, as described in claim 4, it is preferable that a groove portion having a closed curve shape is formed in a boundary portion of an end portion of the opening portion of the instrument panel main body in the airbag cover, and a thin wall portion which is ruptured and a non-thin wall portion which is not ruptured at operating time of the air bag are formed along the groove portion in the airbag cover in a single line shape or a shape of plural continuous lines.

[0011]

As mentioned above, the projecting portion projected in a larger extent than its peripheral portion and having a relatively narrow width is formed in the mold opposed to the core, so that the groove portion having a closed curve shape can be easily formed. Accordingly, in a position continuously connected to the groove portion, a thin wall portion thinner than the thicknesses of wall portions in other positions can be easily formed by forming the groove portion. Further, since the thin wall portion is ruptured earlier than its peripheral portion when pressure is applied to the thin wall portion, this thin wall portion becomes a ruptured portion of the air bag cover at a time when the airbag is operated.

Further, the boundary portion between the airbag cover and the instrument panel can be easily observed by the groove portion mentioned

above, and an excellent appearance in design can be also given depending on a groove shape.

[0012]

Further, in the case that the thin wall portion is ruptured and the airbag cover is opened, it is preferable that the shape of a line forming the thin wall portion and the shape of a line forming the non-thin wall portion are set on the airbag cover such that the non-thin wall portion becomes a rotating central axis of an opening movement of the opening portion of the airbag cover.

[0013]

As a result, in the case that the air bag is operated and the thin wall portion is ruptured, a rotating moment around the non-thin wall portion as a rotating center is applied to a ruptured cover portion and the air bag cover is easily opened, whereby resistance to swelling-out of the air bag can be reduced and the airbag can be easily swollen out.

[0014]

Further, as a combination of the shape of the line forming the thin wall portion and the shape of the line forming the non-thin wall portion for setting the non-thin wall portion to the rotating central axis of the opening movement of the opening portion of the air bag cover as mentioned above, there are, for example, structures as described in claims 5 to 10 mentioned below.

[0015]

For example, as described in claim 5, the non-thin wall portion is formed in a shape of one transversal line on an upper or lower side of the air bag cover, and the thin wall portion is formed in a U-shape along a groove portion in three directions except for the line forming

the non-thin wall portion (refer to Fig. 2). Thus, a cover portion having the U-shape is easily opened with the non-thin wall portion of the line shape as a rotating center.

[0016]

As described in claim 4, characterized in that said non-thin wall portion is formed in a shape of one transversal line on an upper or lower side of the air bag cover, and said thin wall portion is formed along an entire periphery of said groove portion such that a line forming said non-thin wall portion is included in an inner side.

[0017]

It is preferable that the airbag cover is connected to the air bag case via the rib as described later. Non-thin wall portion is formed in a closed curve shape but because the airbag cover is connected to the air bag case via the rib, even if the thin wall portion of the closed curve shape is entirely ruptured throughout its periphery, there is no possibility that the restriction of air bag cover is removed at the operating time of the air bag and scattering.

[0018]

Further, with respect to advantages of this structure, since the thin wall portion of the closed curve shape is entirely ruptured throughout its periphery, and the airbag cover is separated from the instrument panel, no stress is applied to the instrument panel main body by the operation of the airbag at a time when the airbag is operated. Accordingly, there are no situations in which the instrument panel main body is ruptured and a ruptured portion is possibly scattered.

[0019]

Further, as described in claim 5, the non-thin wall portion can

be formed in a shape of one transversal line on each of upper and lower sides of the airbag cover, the thin wall portion can be formed in a shape of one longitudinal line on each of left and right sides of the instrument panel, a second thin wall portion which is not formed along a groove portion can be formed in a shape of one transversal line in a central portion of the airbag cover, and the entire of the first and second thin wall portions can be formed in an H-shape (refer to Fig. 10).

In this case, since the second thin wall portion provided at the center of the cover is ruptured and the cover is opened in two directions, resistance of the cover against swelling-out of the airbag is further reduced.

[0020]

Further, in the case that the rib is provided as described above, as described in claim 6, the non-thin wall portion can be formed in a shape of one transversal line on each of upper and lower sides of the airbag cover, the thin wall portion can be formed along an entire periphery of a groove portion such that a line forming the non-thin wall portion is included in an inner side, a second thin wall portion which is not formed along the groove portion is formed in a shape of one transversal line in a central portion of the airbag, and the entire of the first and second thin wall portions can be formed in a shape in which two quadrilaterals are lined up (refer to Fig. 14).

[0021]

As a result, the same effects as those in claim 4 can be obtained. Further, since the second thin wall portion provided at the center of the cover is ruptured, resistance against swelling-out of the airbag is further reduced. It is preferable that the airbag cover is connected to the air bag case via the rib as described later. Because of this, it is possible

to securely prevent the air bag cover at the operating time of the air bag and scattering.

[0022]

Further, as described in claim 9, the non-thin wall portion can be formed in a shape of one longitudinal line on each of left and right sides of the airbag cover, the thin wall portion can be formed in a shape of one transversal line on each of upper and lower sides of the instrument panel, a second thin wall portion which is not formed along a groove portion can be formed in a shape of one longitudinal line in a central portion of the airbag, and the entire of the first and second thin wall portions can be formed in an H-shape (refer to Fig. 15).

As a result, the same operational effects as those in claim 5 can be obtained.

[0023]

Further, in the case that the rib is provided as described above, as described in claim 10, the non-thin wall portion can be formed in a shape of one longitudinal line on each of left and right sides of the airbag cover, the thin wall portion can be formed along an entire periphery of a groove portion such that a line forming the non-thin wall portion is included in an inner side, a second thin wall portion which is not formed along the groove portion can be formed in a shape of one longitudinal line in a central portion of the airbag, and the entire of the first and second thin wall portions can be formed in a shape in which two quadrilaterals are lined up (refer to Fig. 17).

As a result, the same operational effects as those in claim 6 can be obtained. Furthermore, it is preferable that the rib for connecting to the air bag case is provided to the air bag cover as described later.

[0024]

In this case, as described in claim 2, it is preferable that the rib is provided in the non-thin wall portion in a protruding manner, and the rib is connected to the air bag case via a connection member.

The portion is reinforced by forming the rib, and the non-thin wall portion having the rib can be securely set the rotation center of the opening movement at the opening time of the air bag cover.

Further, the rib is connected to the air bag case via the connection member, so that it is possible to securely prevent the air bag cover from moving apart from the air bag case at the operating time of the air bag and scattering.

[0025]

In accordance with the present invention, there is provided a panel for an air bag of a vehicle in which an air bag cover made of a soft synthetic resin is integrally molded in an instrument panel main body made of a hard synthetic resin, characterized in that

the hard synthetic resin and the soft synthetic resin, which mold both members, have a thermal plasticity and a compatibility,

the panel is structured such that both members are integrally manufactured by arranging a movable core in a male die or a female die, first shutting off between a cavity portion of a first member and a cavity portion of a second member by protruding the core and bringing the core into contact with the opposed mold so as to inject a material for the first member to the cavity portion of the first member, subsequently forming an overlapping portion between both members in a communication portion between both cavities by retreating the core and injecting a material for the second member to the cavity portion of the second member and adhering, thereby integrally manufacturing both members, and continuously arranging

a protruding portion having a predetermined width in an end portion of an air bag cover side of the opposed mold of a contact portion between the core and the opposed mold in the first process so as to be along a boundary portion between both cavities, thereby forming a groove portion formed in a closed curve shape having the width in the boundary portion of the air bag cover with respect to the instrument panel main body, and

a thin wall portion which is ruptured at a time when the air bag is operated and a non-thin wall portion which is not ruptured at a time when the air bag is operated are formed in a shape of single line or a plurality of continuous lines along the groove portion of the air bag cover, and a shape of the line forming the thin wall portion and a shape of the line forming the non-thin wall portion are set on the air bag cover so that the non-thin wall portion forms a rotational center axis of an opening motion of the opening portion of the air bag cover in the case that the thin wall portion is ruptured and the air bag cover is opened.

[0026]

A first point of particularly remarkable matters in the present invention is that the instrument panel main body and the air bag cover are integrally formed by injection molding by the following structure and method.

That is, the hard synthetic resin and the elastomer, which form both members, are set to be compatible with each other, the movable core is provided in a male die or a female die for the injection molding, and first, this core is projected and is brought into contact with the opposed mold. Thus, the portion between the cavity portion of the first member and the cavity portion of the second member is interrupted, and the material of the first member as a material of either of the instrument panel main

body or the air bag cover is injected into the cavity portion forming the first member such that no first member flows into the cavity of the second member.

[0027]

In a subsequent second process, the core is retreated, so that the cavity forming the first member and the cavity forming the second member are communicated with each other, the material of the second member is injected into the cavity portion of the second member, and both members are integrally manufactured by forming an overlapping portion of both members in the communication portion of both the cavity portions and adhering the overlapping portion utilizing compatibility of both materials.

[0028]

As mentioned above, in the present invention, the instrument panel main body and the air bag cover can be manufactured by one injection molding in accordance with a two-color molding method, so that no fixing device for connecting both members to each other is required and no connecting work is required. Accordingly, the number of manufacturing works and cost can be greatly reduced in comparison with a conventional product in which the instrument panel main body and the air bag cover are separately formed.

[0029]

A second point of the particularly remarkable matters in the present invention is that a projecting portion having a predetermined width is continuously provided along a boundary portion between both cavities in an end portion of the airbag side in the opposed mold in a contact portion between the core and the opposed mold in the first process mentioned above, so that a groove portion having a closed curve shape of the predetermined width is formed in a boundary portion between the airbag cover and the

instrument panel main body. Further, a thin wall portion which is ruptured at an operating time of the air bag and a non-thin wall portion which is not ruptured at the operating time of the airbag are formed along the groove portion of the air bag cover in a single continuous line shape or a shape of plural continuous lines.

[0030]

As mentioned above, the projecting portion projected in a larger extent than its peripheral portion and having a relatively narrow width is formed in the mold opposed to the core, so that the groove portion having a closed curve shape can be easily formed. Accordingly, in a position continuously connected to the groove portion, a thin wall portion thinner than the thicknesses of wall portions in other positions can be easily formed by forming the groove portion. Further, since the thin wall portion is ruptured earlier than its peripheral portion when pressure is applied to the thin wall portion, this thin wall portion becomes a ruptured portion of the air bag cover at a time when the airbag is operated.

Further, the boundary portion between the airbag cover and the instrument panel can be easily observed by the groove portion mentioned above, and an excellent appearance in design can be also given depending on a groove shape.

[0031]

A third point of particularly remarkable matters in the present invention is that when the thin wall portion is ruptured and the air bag cover body is opened, the shape of a line forming the thin wall portion and the shape of a line forming the non-thin wall portion are set onto airbag cover such that the non-thin wall portion becomes a rotation central axis of an opening movement of the opening portion of the air bag cover.

[0032]

As a result, in the case that the air bag is operated and the thin wall portion is ruptured, a rotating moment around the non-thin wall portion as a rotating center is applied to a ruptured cover portion and the air bag cover is easily opened, whereby resistance to swelling-out of the air bag can be reduced and the airbag can be easily swollen out.

[0033]

Further, as a combination of thermoplastic material having compatibility, there is a combination of polypropylene resin forming the instrument panel main body and thermoplastic olefin elastomer (TPO) forming the airbag cover and the like, as described in claim 9.

[0034]

[Mode for Carrying out the Invention]

Embodiment 1

The present embodiment is a panel 1 for an air bag of a vehicle in which an air bag cover 20 made of an olefin elastomer (TPO) is integrally molded in an instrument panel main body 10 made of a polypropylene resin (PP) as a hard synthetic resin, as shown in Figs. 1 and 2.

Further, the polypropylene resin and the olefin elastomer, which mold both members 10 and 20, have a thermal plasticity and a compatibility.

[0035]

The panel 1 mentioned above is structured such that both the members 10 and 20 are integrally manufactured, as shown in Fig. 3, by arranging a movable core 32 in a stationary mold 31, first protruding the core 32 and bringing the core 32 into contact with the opposed mold (movable mold) 35, thereby shutting off between a cavity portion 41 of a first member forming the instrument panel main body 10 and a cavity portion 45 of a

second member forming the air bag cover 20, and injecting a first material (PP) structuring the instrument panel main body 10 to the cavity portion 41 of the instrument panel main body 10, as shown in Fig 3(a). Further, both the members 10 and 20 are integrally manufactured by subsequently retreating the core 32, injecting the material (TPO) for the second member to the cavity portion 45 of the second member, forming an overlapping portion 15 (Fig. 1) between both members in a communication portion between both cavity portions 41 and 45, and adhering two members, as shown in Fig. 3(b).

[0036]

Further, a groove portion 21 having a shape of closed curve with the width W is formed in the boundary portion between the air bag cover 20 and the instrument panel main body 10, as shown in Figs. 1 and 2, by continuously arranging a protruding portion 351 having a predetermined width W (Fig. 3(c)) in an end portion of the air bag cover 20 side of the opposed mold 35 in a contact portion between the core 32 and the opposed mold 35 in the first process so as to be along a boundary portion between both cavities 41 and 45.

[0037]

Further, a thin wall portion 23 which is ruptured at a time when the air bag 81 is operated and a non-thin wall portion 24 which is not ruptured at a time when the air bag 81 embedded in the air bag case 82 is operated are formed in a shape of single continuous lines R1 and S1 (Fig. 2) along the groove portion 21 of the air bag cover 20, as shown in Figs. 1, 4 and 5, and a shape of the line R1 and a shape of the line S1 are set so that the non-thin wall portion 24 forms a rotation center axis of an opening motion of the opening portion of the air bag cover 20 in the case that the thin wall portion 23 is ruptured along the line S1

and the air bag cover is opened.

That is, as shown in Fig. 2, the line R1 of the non-thin wall portion 24 is formed in a shape of one transversal line on an upper side of the air bag cover 20, and the line S1 of the thin wall portion is formed in a U-shape along a groove portion in three directions except for the line R1 forming the non-thin wall portion 24.

[0038]

Explanations of each of these elements will be supplemented next.

As shown in Fig. 1, a panel 1 for an airbag in accordance with the present embodiment is a panel which stores an airbag 81 therein and is arranged in a front passenger seat side of a vehicle, and is constituted of an instrument panel main body 10 and an airbag cover 20. A thin wall portion 23 which is ruptured at an operating time of the airbag 81 and makes the airbag 81 swell out is formed in the cover body 20 along a groove portion 21. As shown by a line S1 in Fig. 2, a connecting shape of the thin wall portion 23 is a U-shape.

[0039]

Further, the instrument panel main body 10 and the airbag cover 20 are integrally formed as follows in accordance with a two-color molding.

First, as shown in Fig. 3(a), a core 32 is protruded and is brought into contact with a projecting portion 351 of an opposite mold 35. Accordingly, the clearance between a cavity portion 41 of the instrument panel main body and a cavity portion 45 of the airbag cover 20 is interrupted so that no polypropylene flows a first material structuring the instrument panel main body 10 into the second cavity portion 45, and the polypropylene forming the instrument panel main body 10 is injected into the cavity portion 41.

[0040]

Thereafter, as shown in Fig. 3(b), the core 32 is retreated in a subsequent second process so that the first cavity 41 and the second cavity 45 are communicated with each other. Then, the olefin elastomer a second material structuring the air bag cover 20 is injected into the second cavity portion 45 so as to form an overlapping portion 15 between both the members 10 and 20 in a communication portion between both the cavity portions 41 and 45. Both the members 10 and 20 are integrally manufactured by adhering these members to each other by utilizing compatibility of both materials.

Finally, as shown in Fig. 3(c), movable molds 35 and 36 are separated from each other so as to take out a molded article (the air bag panel). Thereafter, processing such as painting or the like is applied as occasion demands.

[0041]

Therefore, in the present embodiment, the instrument panel main body 10 and the airbag cover 20 can be manufactured by a continuous one-time injection molding process. Hence, no fixing device for connecting both members as in a conventional case nor connecting work between both members are required. Accordingly, the number of producing works and cost can be greatly reduced in comparison with a conventional article.

[0042]

Further, in the present embodiment, as shown in Fig. 3, a projecting portion 351 having a predetermined width W is continuously provided in an end portion close to the airbag cover 20 side of the opposed mold 35 between the core 32 and the opposed mold 35 along a boundary portion between both the cavity portions 41 and 45 and provided the projection portion 311 which continued along the line S1 to the predetermined side of the stationary mold 31 in the first process mentioned above. As a result, as

shown in Figs. 4 and 5, a groove portion 21 having the width W and formed in a shape of a closed curve is formed in a boundary portion between the airbag cover 20 and the instrument panel main body 10. Further, the thin wall portion 23 which is ruptured at a time when the airbag 81 operates and a non-thin wall portion 24 which is not ruptured at a time when the airbag 81 operates are formed in shapes of continuous lines R1 and S1 (Fig. 2) along the groove portion 21.

[0043]

As mentioned above, the groove portion 21 (Fig. 2) having the closed curve shape can be easily formed by forming the projection portion 351 in the opposed mold 35 of the core 32, the projection portion 351 being projected from the peripheral portion having the relatively narrow width W. Further, since the projection portion 311 is provided on the stationary mold 31 in opposition to the groove portion 21, the thin wall portion 23 thinner than wall portions in the other positions can be formed simultaneously with the molding in a position adjacent to the groove portion 21. Further, since the thin wall portion 23 is easily ruptured at a time when pressure caused by swelling-out of the airbag 81 is applied to this thin wall portion 23, the thin wall portion 23 becomes a ruptured portion at a time when the airbag 81 operates.

[0044]

Further, the non-thin wall portion 24 is formed in a shape of one transversal line on an upper side of the cover body 20, and the thin wall portion 23 (thickness T) is formed in a U-shape along the groove portion 21 in three directions except for the line R1 forming the non-thin wall portion 24 as shown by the line S1 (refer to Fig. 2). Therefore, a cover portion ruptured in the U-shape is easily opened around the linear non-thin

wall portion 24 as a center of rotation.

Further, as shown in Fig. 2, the boundary portion between the airbag cover body 20 and the instrument panel main body 10 can be easily observed by forming the groove portion 21, and an excellent appearance in design can be obtained depending on a shape of the groove portion 21.

[0045]

Embodiment 2

As shown in Fig. 6, the present embodiment is another embodiment in which a rib 25 is projected in the non-thin wall portion 24 in the embodiment 1, and the rib 25 is connected to an airbag case 82 via a connection member.

That is, the rib 25 projected onto a rear side of the airbag cover 20 is supported by a steel retainer 251 having a bead for preventing falling-out on its surface, and is fixed to a bracket 811 of the airbag case 82 via a bolt 252 and a nut 253.

In this drawing, reference numeral 255 denotes a fixing device for fixing the airbag case 82 to the instrument panel main body 10.

[0046]

Further, in an injection molding process of the panel, a concave portion 331 is provided in the fixing mold 33 as shown in Fig. 7, so that the rib 25 is formed.

The panel 1 in the present embodiment is reinforced by the rib 25. A root portion of the non-thin wall portion 24 having the rib 25 becomes a rotation center of an opening movement of the airbag cover at its opening time. That is, in the case that the thin wall portion 23 is ruptured, a ruptured portion formed in a U-shape of the airbag cover 20 is rotated and opened around a root C of the rib 25 as a rotation center.

[0047]

Further, since the rib 25 is tightly fixed to the bracket 811 of the airbag case 82 via the connecting member mentioned above. Accordingly, even when the airbag cover 20 is separated from the instrument panel main body 10 at the operating time of the airbag 81, the airbag cover 20 is neither shifted from the airbag case 82 nor scattered.

Other elements are the same as those of the embodiment 1.

[0048]

Embodiment 3

As shown in Fig. 8, the present embodiment is another embodiment in which a minimum thickness T1 of the non-thin wall portion 24 is set to be 1.5 times or more a thickness T2 of the cover 20 in the embodiment 2.

[0049]

The minimum thickness T1 is increased as mentioned above to reinforce the non-thin wall portion. Accordingly, even if the retainer 251 is dislocated from the bracket 811 by the operation of the airbag 81, the non-thin wall portion 24 as a rotation center of the opening movement of the airbag cover 20 is very unlikely to be ruptured. Therefore, it is possible to obtain the panel 1 for the airbag with higher safety.

Other elements are the same as those of the embodiment 2.

[0050]

Embodiment 4

The present embodiment is still another embodiment in which the non-thin wall portion 24 is formed in a shape of one transversal line on an upper side of the airbag cover 20 in the embodiment 2 or the embodiment 3, and, as shown in Fig. 9, the thin wall portion 23 is formed along the entire periphery of the groove portion 21 as shown by a closed curve S2

such that a line R1 forming the non-thin wall portion 24 is included in an inner side.

[0051]

The thin wall portion 23 is formed in a shape of the closed curve S2, however, the cover 20 is connected to the airbag case 82 via the rib 25. Accordingly, even when the thin wall portion 23 formed in the closed curve S2 is entirely ruptured throughout the entire periphery and is separated from the instrument panel main body 10, the cover 20 is neither separated nor scattered at a time when the airbag is operated.

[0052]

In addition, the airbag cover body 20 is separated from the instrument panel main body 10 by entirely rupturing the thin wall portion 23 formed in the closed curve along its entire periphery, whereby the following advantages are generated. That is, no tensile stress caused by the cover 20 is applied to the instrument panel main body 10 at a time when the airbag is operated. Accordingly, situations hardly occur in which the instrument panel main body 10 is damaged by the stress caused by operating the airbag and is partially damaged and scattered in a certain case, and safety of the airbag is greatly improved.

Other elements are the same as those of the embodiment 2 or the embodiment 3.

[0053]

Embodiment 5

As shown in Figs. 10 and 11, the present embodiment is another embodiment in which the non-thin wall portion 24 having the rib 25 in the embodiment 2 is formed in the shapes of transversal one lines R1 and R2 on upper and lower sides of the airbag cover 20, respectively, and as shown

in Fig. 10, the thin wall portion 23 is formed in the shapes of longitudinal one lines S31 and S32 on the left and right sides of the airbag cover 20, respectively, and further, a second thin wall portion 26 (Fig. 11) which is not formed along the groove portion 21 is formed in the shape of a transversal one line S33 in a central portion of the airbag cover 20, whereby the first and second thin wall portions 23 and 26 are entirely formed in an H-shape.

[0054]

In the present embodiment, the central second thin wall portion 26 is ruptured at a time when the airbag is operated, and an opening portion of the cover 20 is easily opened on the left and right sides in Fig. 11 around the non-thin wall portion 24 of the transversal one lines R1 and R2 as a rotating center.

Other elements are the same as those of the embodiment 2.

[0055]

Embodiment 6

As shown in Figs. 12 and 13, the present embodiment is still another embodiment in which no rib 25 is provided in the embodiment 5.

Since no rib 25 is provided, the airbag can be manufactured at a lower cost in comparison with the embodiment 5. However, since no rib 25 is provided, strength or other properties of the airbag are relatively inferior to those in the embodiment 5.

Other elements are the same as those of the embodiment 5.

[0056]

Embodiment 7

As shown in Fig. 8, the present embodiment is another embodiment in which minimum thickness T1 of the non-thin wall portion 24 is set to be 1.5 times or more a thickness T2 of the airbag cover 20 in the embodiment

5.

The minimum thickness T1 is increased as mentioned above to reinforce the non-thin wall portion. Accordingly, even if the retainer 251 is dislocated from the bracket 811 by the operation of the airbag 81, the non-thin wall portion 24 as a rotation center of the opening movement of the cover is very unlikely to be ruptured. Therefore, it is possible to obtain the panel 1 for the airbag with excellent safety.

Other elements are the same as those of the embodiment 5.

[0057]

Embodiment 8

As shown in Fig. 14, the present embodiment is another embodiment in which the thin wall portion 23 is formed in transversal one lines S34 and S35 on upper and lower sides of the airbag cover 20 in the embodiment 5, whereby the first and second thin wall portions 23 and 24 are entirely formed in a shape in which two quadrilaterals are lined up.

[0058]

In the present embodiment, the thin wall portion 23 formed in a closed curve is entirely ruptured throughout the entire periphery, so that the airbag cover 20 is separated from the instrument panel main body 10 at the operating time of the airbag.

As a result, no tensile stress from the airbag cover 20 is applied to the instrument panel main body 10 at the operating time of the airbag. Accordingly, situations hardly occur in which the instrument panel main body 10 is damaged by stress caused by operating the airbag and is partially damaged and scattered in a certain case. Therefore, safety of the airbag is improved.

Other elements are the same as those of the embodiment 5.

[0059]

Embodiment 9

As shown in Figs. 15 and 16, the present embodiment is still another embodiment in which the non-thin wall portion 24 in the embodiment 2 is formed in the shapes of longitudinal one line R3 and R4 on the left and right sides of the air bag cover, respectively, the thin wall portion 23 is formed in the shapes of transversal one lines S34 and S35 on the upper and lower sides of the airbag cover 20, respectively, and a second thin wall portion 26 which is not formed along the groove portion 21 is formed in the shape of a longitudinal one line S36 in a central portion of the airbag cover 20, whereby the first and second thin wall portions 23 and 26 are entirely formed in an H-shape.

[0060]

In the present embodiment, the central second thin wall portion 26 is ruptured at a time when the airbag is operated, and an opening portion of the cover 20 is easily opened on the left and right sides in Fig. 11 around the non-thin wall portion 24 as a rotating center.

Other elements are the same as those of the embodiment 2.

[0061]

Embodiment 10

The present embodiment is another embodiment in which no rib 25 is provided in the embodiment 9.

Since no rib 25 is provided, the airbag can be manufactured at a lower cost in comparison with the embodiment 9, however, since no rib 25 is provided, strength or other properties of the airbag are relatively inferior to those in an airbag with the rib.

Other elements are the same as those of the embodiment 9.

[0062]

Embodiment 11

As shown in Fig. 8, the present embodiment is another embodiment in which a minimum thickness T1 of the non-thin wall portion 24 is set to be 1.5 times or more a thickness T2 of the airbag cover 20 in the embodiment 9.

The minimum thickness T1 is increased as mentioned above to reinforce the non-thin wall portion. Accordingly, even if the retainer 251 is dislocated from the bracket 811 by the operation of the airbag 81, the non-thin wall portion 24 as a rotation center of the operating movement of the airbag cover 20 is very unlikely to be ruptured. Therefore, it is possible to obtain the panel 1 for the air bag with extremely excellent safety.

Other elements are the same as those of the embodiment 9.

[0063]

Embodiment 12

As shown in Fig. 17, the present embodiment is still another embodiment in which the thin wall portion 23 is formed on longitudinal one lines S31 and S32 on the right and left sides of the airbag cover 20 in the embodiment 9, whereby the first and second thin wall portions 23 and 24 are entirely formed in a shape in which two quadrilaterals are lined up.

Since the thin wall portion 23 formed in a closed curve is entirely ruptured throughout the entire periphery, so that the airbag cover 20 is separated from the instrument panel main body 10 at the operating time of the airbag.

[0064]

As a result, tensile stress from the cover 20 is not applied to

the instrument panel main body 10 at the operating time of the airbag. Accordingly, danger hardly occurs that the instrument panel main body 10 is damaged by stress caused by operating the airbag and is partially damaged and scattered in a certain case. Therefore, safety of the airbag is improved.

Other elements are the same as those of the embodiment 9.

[0065]

Embodiment 13

In the present embodiment, as shown in Fig. 18, a concavo-convex portion 159 having a sawtooth shape is provided on a lower face of the instrument panel main body 10 in an overlapping portion 15.

This concavo-convex portion 159 is formed in a non-thin wall portion as well as in the thin wall portion 23.

This concavo-convex portion 159 is formed by using a core imparted a concavo-convex shape which is used in molding and then molding the instrument panel main body 10 and the airbag cover 20 by two-color molding by using this core in the same manner as that of the embodiment 1.

In this case, the thin wall portion t has 0.8 mm in thickness.

Other elements are the same as those of the embodiment 1.

[0066]

In the present embodiment, the concavo-convex portion 159 having the sawtooth shape is provided in the overlapping portion 15 of the instrument panel main body 10. Therefore, both members are tightly joined because of an anchor effect of the airbag cover 20 in this concavo-convex portion 159. Accordingly, the airbag cover 20 is neither disclosed from the instrument panel main body 10 nor scattered at a time when the airbag is operated.

In addition, in the present embodiment, the same effects as those

of the embodiment 1 can be also obtained.

[0067]

Embodiment 14

In the present embodiment, as shown in Fig. 19, a concavo-convex portion 158 formed in a downward convex shape is provided on a lower face of the instrument panel main body 10 in the overlapping portion 15.

Other elements are the same as those of the embodiment 13.

[0068]

In the present embodiment, similarly to the embodiment 13, the anchor effect is improved by the concavo-convex portion 158 in the overlapping portion 15, so that the joining strength of the airbag cover 20 to the instrument panel main body 10 is improved.

In addition, in the present embodiment, the same effects as those of the embodiment 1 can be also obtained.

[0069]

Embodiment 15

As shown in Fig. 20, a panel for an airbag in the present embodiment is provided with a melt-bonded portion 157 formed in the overlapping portion 15 such that the instrument panel main body 10 and the airbag cover 20 are joined by high frequency induction heating or vibration melt-bonding.

The other elements are the same as those of the embodiment 13.

In the present embodiment, the melt-bonded portion 157 is provided by joining both the members 10 and 20 by the high frequency induction heating or the vibration melt-bonding. Therefore, the joining strength of both members is improved.

In addition, in the present embodiment, the same effects as those of the embodiment 13 can be also obtained.

[0070]

[Effect of the Invention]

As described above, in accordance with the present invention, it is possible to obtain the panel for the air bag for the vehicle which can be easily manufactured at a low cost.

[Brief Description of Drawings]

[Fig. 1]

Fig. 1 is a cross sectional view of a panel for an airbag in accordance with an embodiment 1 (a cross sectional view taken along a line X1-X1 of Fig. 2).

[Fig. 2]

Fig. 2 is a perspective view of the panel for the airbag in accordance with the embodiment 1.

[Fig. 3]

Fig. 3 is an arrangement view of a mold in a process of molding the panel for the airbag in accordance with the embodiment 1.

[Fig. 4]

Fig. 4 is an enlarged view of a periphery of a thin wall portion of Fig. 1.

[Fig. 5]

Fig. 5 is an enlarged view of a periphery of a non-thin wall portion of Fig. 1.

[Fig. 6]

Fig. 6 is a cross sectional view of a panel for an airbag in accordance with an embodiment 2 (a cross sectional view taken along a line X1-X1 of Fig. 2).

[Fig. 7]

Fig. 7 is an arrangement view of a mold in a process of molding the panel for the airbag in accordance with the embodiment 2.

[Fig. 8]

Fig. 8 is an enlarged view of a periphery of a non-thin wall portion in accordance with an embodiment 3.

[Fig. 9]

Fig. 9 is a perspective view of a panel for an airbag in accordance with an embodiment 4.

[Fig. 10]

Fig. 10 is a perspective view of a panel for an airbag in accordance with an embodiment 5.

[Fig. 11]

Fig. 11 is a cross sectional view taken along a line X2-X2 of Fig. 10.

[Fig. 12]

Fig. 12 is a perspective view of a panel for an airbag in accordance with an embodiment 6.

[Fig. 13]

Fig. 13 is a cross sectional view taken along a line X3-X3 of Fig. 12.

[Fig. 14]

Fig. 14 is a perspective view of a panel for an airbag in accordance with an embodiment 8.

[Fig. 15]

Fig. 15 is a perspective view of a panel for an airbag in accordance with an embodiment 9.

[Fig. 16]

Fig. 16 is a cross sectional view taken along a line Y1-Y1 of Fig. 15.

[Fig. 17]

Fig. 17 is a perspective view of a panel for an airbag in accordance with an embodiment 12.

[Fig. 18]

Fig. 18 is a perspective view of a panel for an airbag in accordance with an embodiment 13.

[Fig. 19]

Fig. 19 is a perspective view of a panel for an airbag in accordance with an embodiment 14.

[Fig. 20]

Fig. 20 is a perspective view of a panel for an airbag in accordance with an embodiment 15.

[Fig. 21]

Fig. 21 is a perspective view of a panel for an airbag in a conventional art.

[Description of Reference Numerals]

1 ... panel for an air bag,

10 ... instrument panel main body,

15 ... overlapping portion,

20 ... air bag cover,

21 ... groove portion,

23 ... thin wall portion,

24 ... non-thin wall portion,

25 ...rib.

Abstract

[Problem To Be Solved]

The present invention provides a panel for an airbag for a vehicle which is easily manufactured at a low cost.

[Solution]

A panel 1 for an air bag of a vehicle in which an air bag cover 10 made of a soft synthetic resin is integrally molded in an instrument penal main body 10 made of a hard synthetic resin. A joint portion joined with said airbag cover provided around an opening portion formed in said instrument panel main body. The joint portion constitutes an overlapping portion 15 in which said airbag cover is overlapped as being arranged on an inner side.

[Representative Drawing] FIG. 1